Where's the Beam?

As-Built Survey of NuMI-MINOS

Dave Boehnlein
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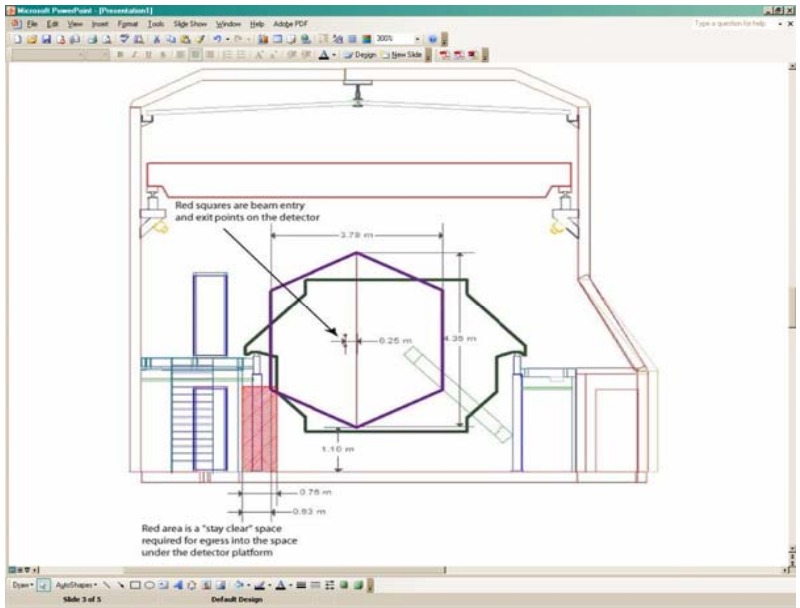
Current Estimate in TDR



- TDR cartoon is based on design drawings.
- FNAL Metrology group has made fresh measurements of MINOS Plane 0
  - Collar Center
  - NuMI beam center
- Beam intercepts with MINERvA as shown in TDR change.

A Little Background

- The positions of beamline elements are maintained in a *Beamsheet.*
- The NuMI beamsheet includes a point MCZERO, the zero-point for Monte Carlo.
- The new survey was motivated by the need to determine the precise distance from MCZERO to MINOS for the Daikon version of the MINOS Monte Carlo.
- Data provided by Virgil Bocean, based on recent surveys of Plane 0 combined with construction & beamsheet data.
- Laser tracker data are of sub-millimeter precision; I have rounded them to the nearest centimeter for this talk.

Station from MCZero

- MINOS Plane 0 (upstream face) - MCZero = **1036.49 m**
- Assume for MINERvA:
  - Downstream face is 2.00 m from the upstream face of MINOS Plane 0;
  - Upstream face of MINERvA is 5.50 m from downstream face.
- MINERvA upstream face – MCZero = **1028.99 m**

Fitted Survey Data

- Four points in beamsheet coordinates
  - Beam Center Intercept with Plane 0 (in feet)

    X = 97306.42 ; Y = 99374.35 ; Z = 415.83
  - Beam Center Intercept with Plane 281

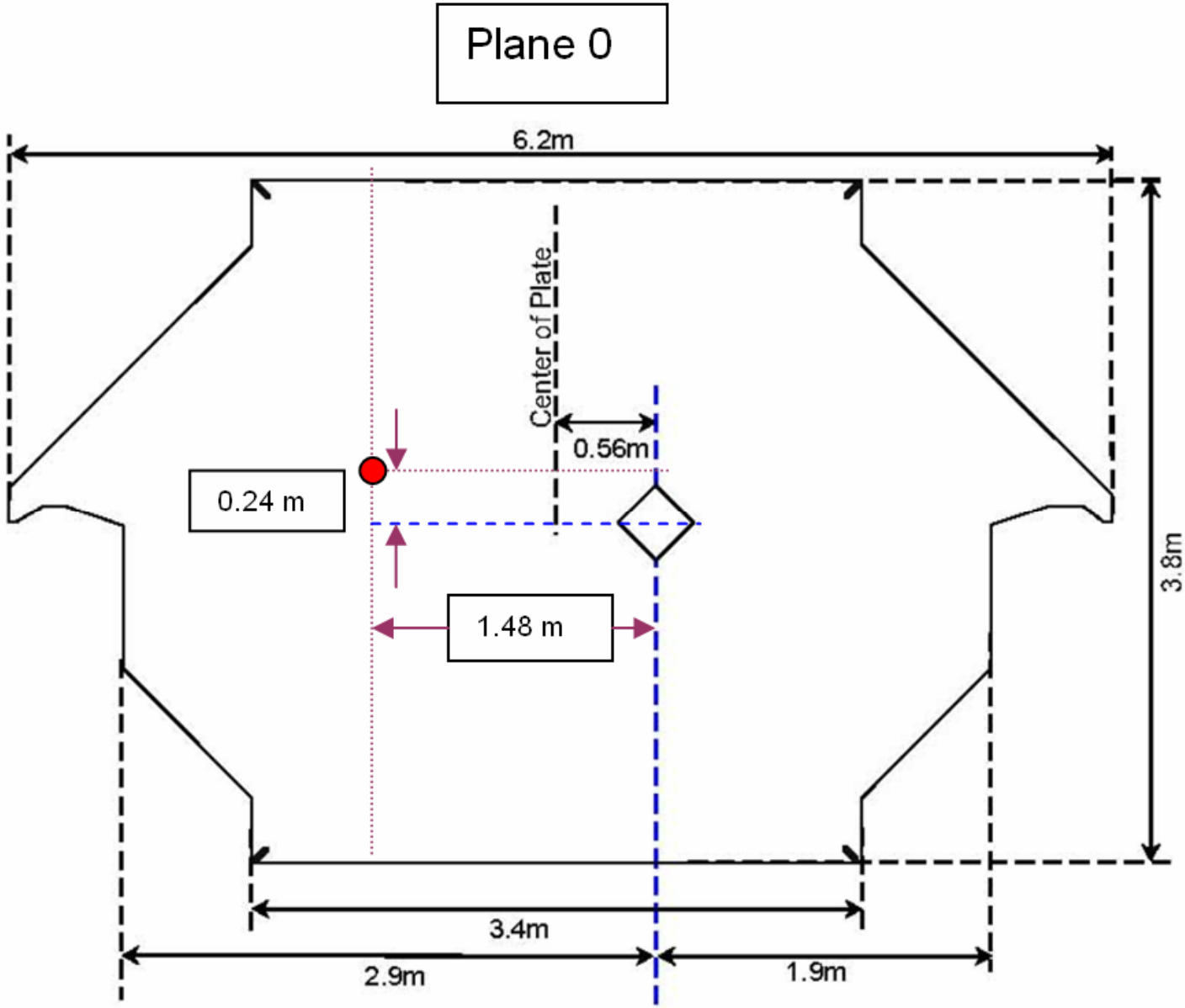
    X = 97257.73 ; Y = 99400.05 ; Z = 412.62
  - Center of Collar 0

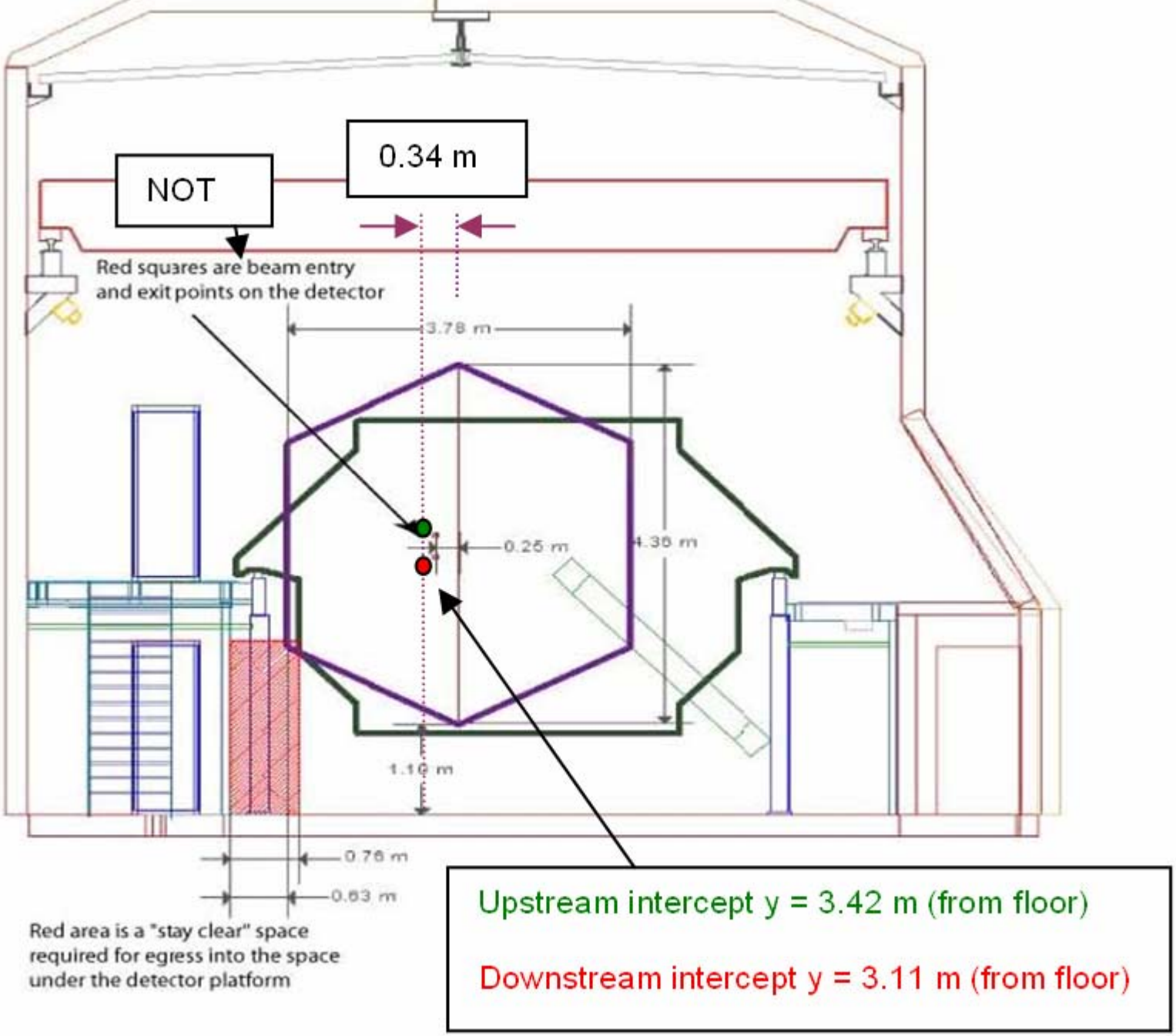
    X = 97308.69 ; Y = 99378.65 ; Z = 415.05
  - Center of Collar 281

    X = 97259.99 ; Y = 99404.34 ; Z = 415.03

Translation to MINOS Coordinates

- z is along the detector axis (note: this is not the beam direction!)
- y is vertical
- x is detector “west”, perpendicular to y and z.
- Virgil constrained the collar and intercept points to be on the surface of the plane, i.e., z = 0.


Plane 0
6.2m
Center of Plate
0.56m
0.24 m
1.48 m
3.8m
3.4m
2.9m
1.9m


NOT
0.34 m
Red squares are beam entry
and exit points on the detector
3.78 m
0.25 m
4.36 m
1.16 m
0.76 m
0.63 m
Red area is a "stay clear" space
required for egress into the space
under the detector platform
Upstream intercept y = 3.42 m (from floor)
Downstream intercept y = 3.11 m (from floor)